



Handling Components

Servo horizontal axis

USER MANUAL
MECHANICAL PART SHA-470

Edition: 506498

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Introduction

This user manual describes the mechanical design, load limits, installation, maintenance and spare parts of the servo horizontal axis SHA-470. It forms an integral part of the user manuals of the servo amplifier and the operator software.

EC conformance (to EC Directive on Machines, Appendix II A)

Regulations and standards taken into account:

- EC Directive on Machines 89/392/EEC, 91/368/EEC

Manufacturer

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Product description and application

The servo horizontal axis SHA-470 is an electrically operated position-controlled linear unit which serves as the base unit in the construction of portal loaders. Depending on the size of the unit, movements in the x-axis up to 800, 1200, 1600, 2000 or 2400 mm are possible. Linear units (LEP) or compact slides (KSD) can be fitted to carry out vertical movements. Units of other systems or any tool-bearing units can also be attached as long as they do not exceed the load limits of the servo horizontal axis SHA-470.

Servo horizontal axes SHA-470 that have been retrofitted to portal loaders are suited for many and varied tasks such as replenishing machines, small parts assembly, transposition, packaging, palletizing as well as parts supply from magazines containing workpieces.

Dangers

The use of servo horizontal axes SHA-470 in equipment is permissible only if they provide protection by **moveable separating protective devices to EN 292-2 section 4.2.2.3**. Observe the operating conditions and safety notes described in the user manual for the your controller. It is absolutely essential that you keep within the stated load limits.



Important!

During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature). During maintenance work on the Servo horizontal axis ensure that the power to the drive is switched off. The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.

- Switch off the enable signal
- Switch off the mains power (L1, L2, L3)
- Ensure that no unauthorized switching-on of the supply voltage can occur.

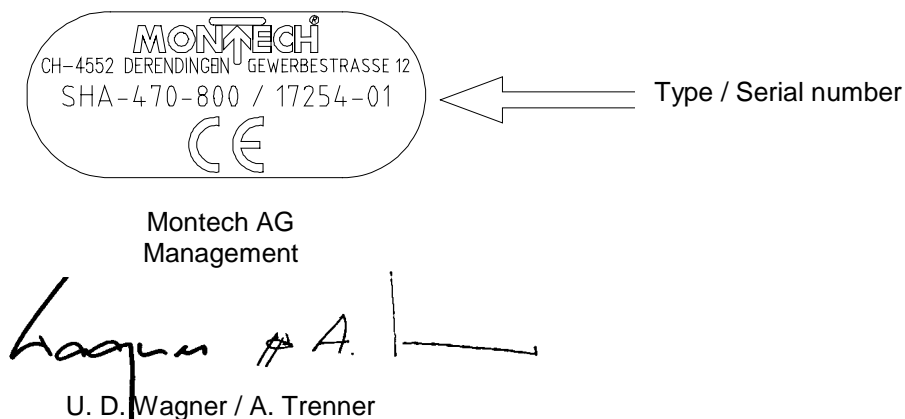
Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

Additional information

The present user manual is intended to allow proper and safe operation of your Servo horizontal axis SHA-470. Should any information for your particular application be missing, please contact Montech. When ordering user manuals it is imperative that you quote the serial number on the front panel of the controller.

Single copies of user manuals are provided free of charge.

Fig. 1



Validity of the user manual

Our products are continually updated to reflect the latest state of the art and practical experience.

In line with product developments, our user manuals are continually updated.

To avoid confusion, please satisfy yourself that the present user manual is valid for the servo horizontal axis SHA to be commissioned.

Every user manual has an edition number, e.g. 506457 (Fig. 2). The label affixed to the title page shows the product series number for which the edition number on the user manual is valid.

Fig. 2

Edition	
Edizione	
Utgava	506457
Edition	
Ausgabe	
Valable pour	
Valido per	Series
Giltig für	
Valid for	17254
Gültig für	

Technical data

		SHA-470-800	SHA-470-1200	SHA-470-1600	SHA-470-2000	SHA-470-2400
Item no.		48292	48293	48294	48295	48296
max. stroke	[mm]	800	1200	1600	2000	2400
Own weight	[kg]	20.8	24.7	28.5	32.4	36.2
Permissible loads		see load calculations				
max. permissible mounting mass	[kg]	15				
max. moment $M_{x_{max}}$	1) [Nm]	55				
max. moment $M_{y_{max}}$	1) [Nm]	90				
max. Moment $M_{z_{max}}$	1) [Nm]	100				
max. acceleration	2) [m/s^2]	10				
max. speed	[mm/s]	2300				
min. accel. / decel. time	2) [ms]	230				
Repeating accuracy	3) [mm]	+/- 0.05				
Reference position approach switch		integrated inductive proximity switch PNP				
Drive		highly dynamic synchronous servo motor				
Motor, nominal rating	[W]	470				
Transmitter system		Resolver				
Enclosure protection for servo motor		IP64				
max. operating temperature of motor	4) [°C]	65				
Ambient conditions: Temperature	[°C]	10 ... 50				
Rel. humidity		5% ... 85% non condensing				
Air purity		normal workshop atmosphere				
Installation position of horizontal axis		horizontal				
Sound level	[dBA]	<65				
Warranty period		2 years from the date of delivery				

1) See load calculations

2) At max. permissible mounting mass at max. speed

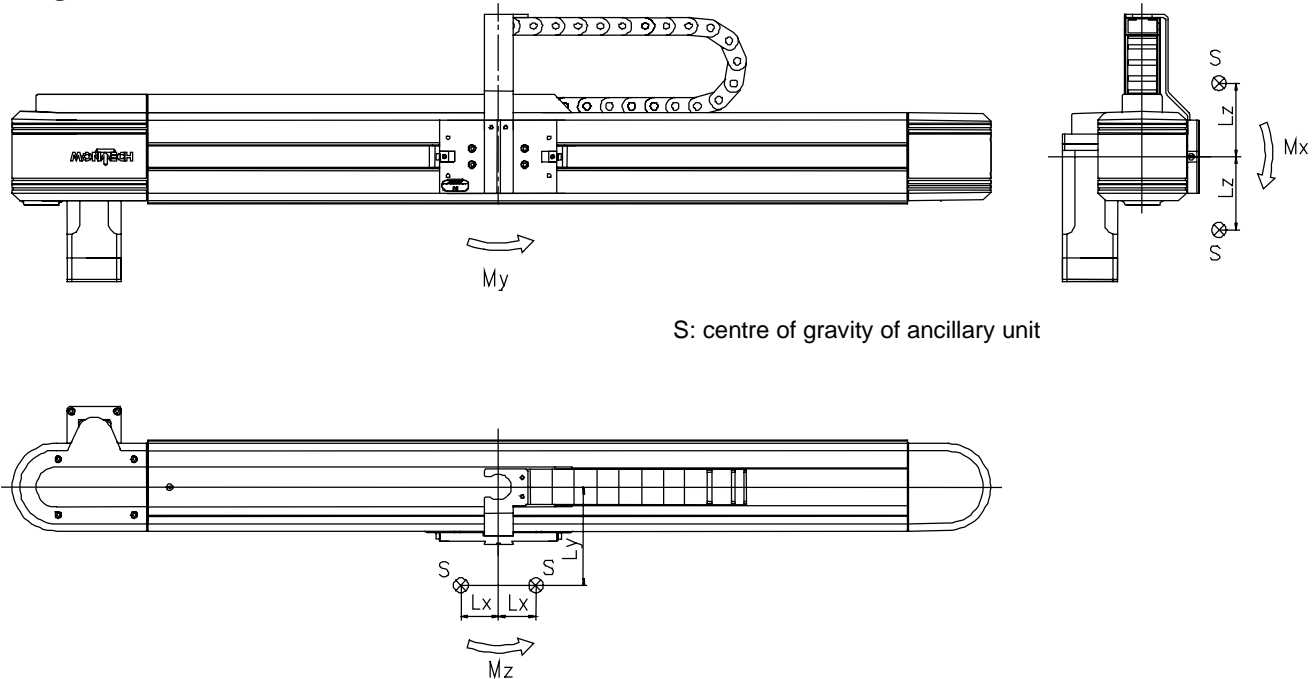
3) At constant motor temperature. Maximum position deviations when moving to a defined target position +/- 0.1mm. Measured at max. load, max. speed and 100 consecutive traverses.

4) At 20°C ambient temperature

Load calculations

The load calculations stated in Technical data are maximum values during single load. The following calculations apply to the combined loads experienced in practical applications:

Fig. 3



a) Existing moments

$$M_x = 0.01 \cdot m_l \cdot (L_y - 34)$$

$$M_y = 0.001 \cdot m_l \cdot \frac{v}{t} \cdot L_z + 0.01 \cdot m_l \cdot L_x$$

$$M_z = 0.001 \cdot m_l \cdot \frac{v}{t} \cdot (L_y - 34)$$

M_x, M_y, M_z	:	Existing moments [Nm]
m_l	:	Mounting mass [kg]
L_x, L_y, L_z	:	Gravity distance of the moving mass [mm]
v	:	Traversing rate $v_{\max}=2300$ [mm/s]
t	:	Acceleration or deceleration time $t_{\min}=230$ [ms]

b) Combined loads

$$B = \frac{M_x}{55} + \frac{M_y}{90} + \frac{M_z}{100} + \frac{m_l}{90} \leq 1$$

B : Load factor → **Must not exceed the value 1!**

Designing the plant

When designing the plant, the following points must be taken into account:

- The servo horizontal axis SHA-470 must only be operated behind a protective device to EN 292-2 section 4.2.2.3.
- Ensure unrestricted ventilation of the motor (50/80, Fig. 4) and keep within the permitted ambient temperatures.
- Realize a low-oscillating quick-set construction.

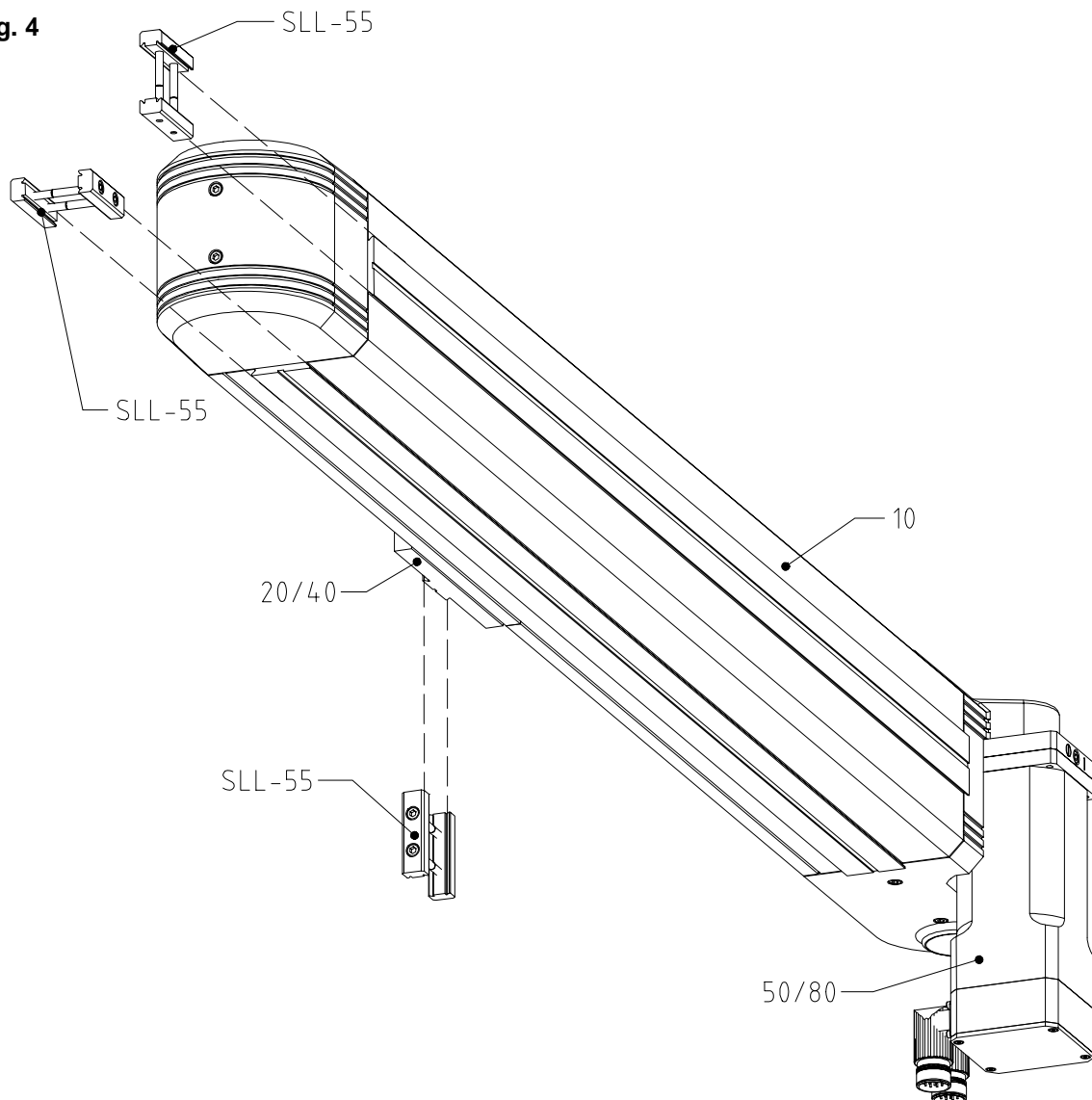
Installation position and assembly

The servo horizontal axis SHA-470 is installed horizontally so that the motor (50/80, Fig. 4) is positioned underneath the carrier profile (10, Fig. 4) and the two dovetail guides are in a horizontal position.

Attachment is via the bottom or rear dovetail of the carrier profile (10, Fig. 4) by means of quick-set tension elements SLL-55.

Installation of accessories is via the dovetail of the adapter plate (20/40, Fig. 4) by means of a tension element SLL-55.

Fig. 4



Connecting the inductive proximity switch



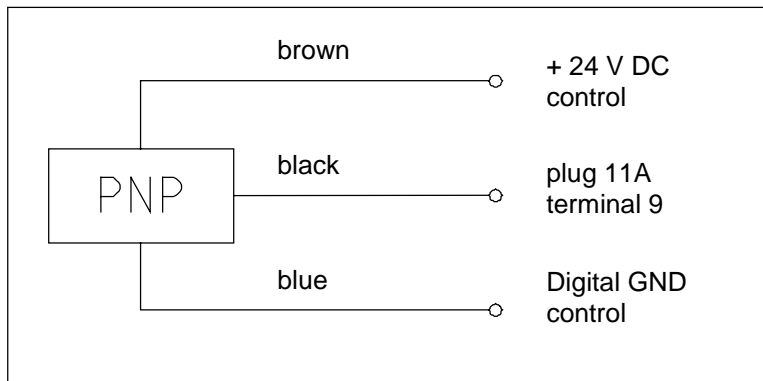
- The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.
- Ensure that no unauthorized switching-on of the supply voltage can occur.
- During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).
- Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

The length of the cable of the supplied inductive proximity switch is 5m.

The distance between the proximity switch and the activation surface has been set at the factory. Only when the switch is being replaced will it become necessary to set this distance anew according to "Changing and setting the inductive proximity switch".

Wiring of the proximity switch is according to the following diagram. After wiring, check the function of the proximity switch.

Fig. 5



Connecting the motor cable and the resolver cable



- The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.
- Ensure that no unauthorized switching-on of the supply voltage can occur.
- During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).
- Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

The supplied motor cables and resolver cables are 5m in length. The cables are ready-made with coded concentric plugs on the motor side.

Lubrication



- The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.
- Ensure that no unauthorized switching-on of the supply voltage can occur.
- During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).
- Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

- Remove both protective plugs (470, Fig. 6).
- Push the slide until the lubricating nipples (20/130, Fig. 8) can easily be reached.

Lubrication is via the felt wicks (20/90, Fig. 8) which are pressed to the shafts (10/20, Fig. 7) by springs (20/120, Fig. 8). Use ONLY Klüber oil "Paraliq 460" as a lubricant.

- Lubrication interval: 800 operating hours.
- Lubrication points: 4 lubricating nipples (20/130, Fig. 8) on the end plates (20/20, Fig. 8).

Changing the toothed belt (270, Fig. 6)

- Carry out a reference traverse.
- Switch the supply voltage off.



- The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.
- Ensure that no unauthorized switching-on of the supply voltage can occur.
- During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).
- Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

- Mark the position of the slide.
- Undo screws (380, Fig. 6) and remove top cover (90, Fig. 6).
- Mark the position of the motor shaft.
- Undo screws (380 and 390, Fig. 6) and remove bottom cover (100, Fig. 6).
- Undo screws (280, Fig. 6) and remove guard plate (40, Fig. 6).
- Undo screws (300, Fig. 6) and remove them.
- Undo screw (320, Fig. 6) and push the motor (50/80, Fig. 9) to the rear stop position.
- Replace the toothed belt (270, Fig. 6). The positions of the slide and motor must be in accordance with the markings.
- **Lightly** tension the toothed belt (270, Fig. 6) by turning the machine screw (320, Fig. 6).
- Screw in the machine screws (300, Fig. 6) and ribbed washers (360, Fig. 6) but do **not** tighten.
- Set the toothed belt pretension according to "Setting the toothed belt pretension" and carry out final assembly.
- Check the work carried out.
- Carry out offset correction according to the operator software manual "Commissioning after mechanical maintenance work".

Changing the toothed belt (180, Fig. 6)

- Carry out a reference traverse (homing).
- Switch the supply voltage off.



- **The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.**
- **Ensure that no unauthorized switching-on of the supply voltage can occur.**
- **During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).**
- **Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.**

- Mark the position of the slide.
- Undo machine screws (380, Fig. 6) and remove the top cover (90, Fig. 6).
- Push the slide to the marked position and mark the motor shaft position.
- Undo screws (380 and 390, Fig. 6) and remove the bottom cover (100, Fig. 6).
- Undo the machine screws (370, Fig. 6) and remove the cover (110, Fig. 6).
- Undo the counter screw (460, Fig. 6) (do not remove).
- Undo machine screws (340, Fig. 6) and remove the toothed belt (180, Fig. 6) including the mounted clamps (190 and 200, Fig. 6) from the slide.
- Undo the machine screws (430, Fig. 6) until the clamps (190 and 200, Fig. 6) can be removed from the toothed belt (180, Fig. 6).
- On the end face, attach a new toothed belt to the old belt. The adhesive tape must adhere reliably, otherwise extensive dismantling of the servo horizontal axis will be required.
- Carefully pull the new toothed belt through the carrier profile (10, Fig. 6) and remove the old toothed belt.
- Install in reverse order but do not tension the toothed belt (180, Fig. 6) and do not install the top cover (90, Fig. 6). It must be possible to turn the motor shaft without linear movement of the slide.
- Push the slide and turn the motor shaft to the marked position.
- Set the toothed belt pretension according to "Setting the toothed belt pretension" (180, Fig. 6) and secure.
- Check the marked positions, correct if necessary.
- Install the top cover (90, Fig. 6) and screw in and tighten the machine screws (380, Fig. 6).
- Check the work carried out.
- Carry out offset correction according to the operator software manual "Commissioning after mechanical maintenance work".

Setting the toothed belt pretension (270, Fig. 6)



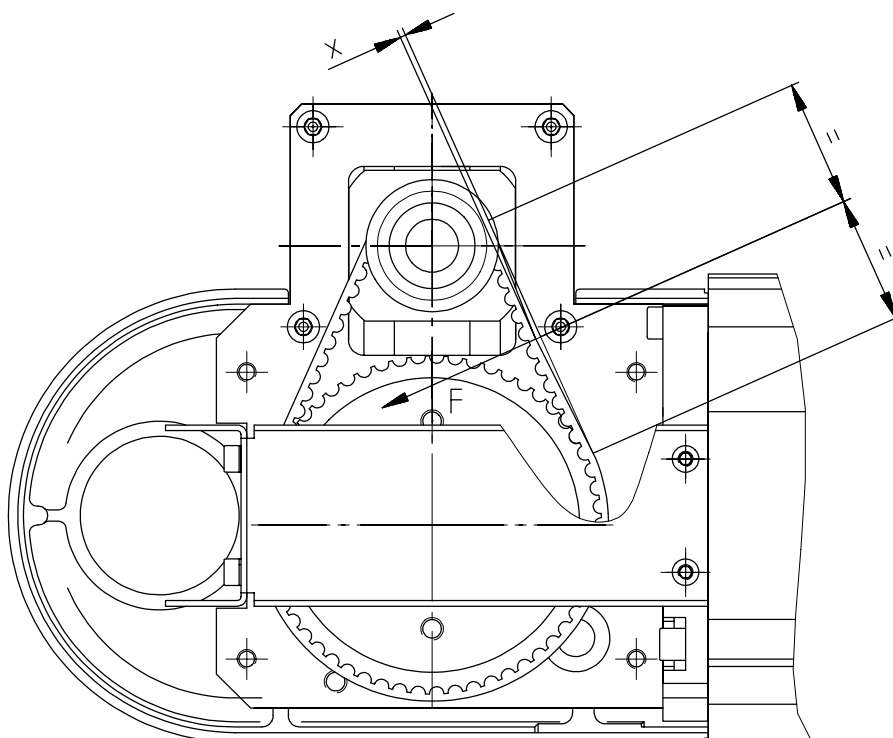
- The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.
- Ensure that no unauthorized switching-on of the supply voltage can occur.
- During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).
- Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

- Undo screws (380, Fig. 6) and remove top cover (90, Fig. 6).
- Undo screws (300, Fig. 6) (do not remove).
- Set the toothed belt pretension according to the following table by turning the machine screw (320, Fig. 6).
- Tighten machine screws (300, Fig. 6).
- Check the toothed belt pretension according to the following table.
- Install the top cover (90, Fig. 6) and screw in and tighten the machine screws (380, Fig. 6).
- Carry out offset correction according to the operator software manual "Commissioning after mechanical maintenance work".



The initial tension values shown in the table are maximum values. Subjecting the toothed belt to **higher initial tension will result in premature wear** of the toothed belt **and an increase in the noise level**.

Type	Deflection force F [N]	Excursion x [mm]
SHA-470	13	1.4



Setting the toothed belt pretension (180, Fig. 6)



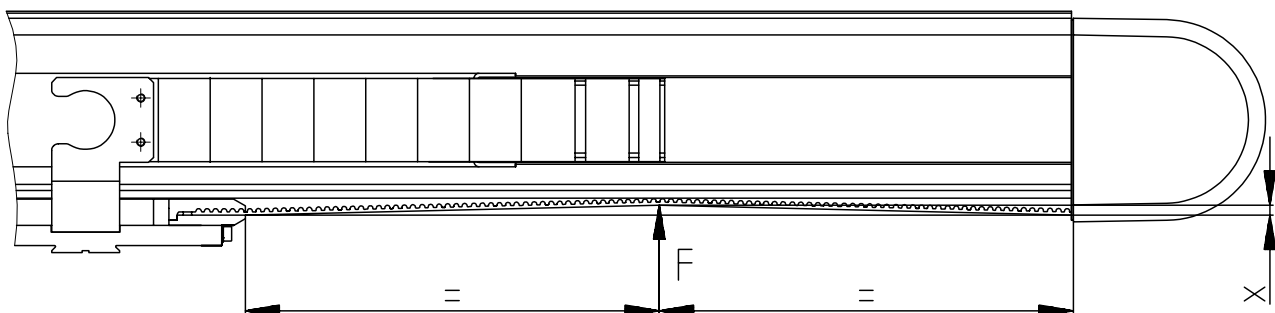
- The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.
- Ensure that no unauthorized switching-on of the supply voltage can occur.
- During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).
- Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

- Push the slide to the stop position on the drive side.
- Undo the counter screw (460, Fig. 6) (do not remove).
- Set the toothed belt pretension according to the following table by turning the machine screw (340, Fig. 6).
- Check the toothed belt pretension according to the following table.
- Tighten the counter screw (460, Fig. 6).
- Carry out offset correction according to the operator software manual "Commissioning after mechanical maintenance work".



The initial tension values shown in the table are maximum values. Subjecting the toothed belt to **higher initial tension** will result in **premature wear** of the toothed belt **and an increase in the noise level**.

Type	Initial tension [N]	Deflection force F [N]	Excursion x [mm]
SHA-470-800	330	9.6	6
SHA-470-1200	330	6.4	6
SHA-470-1600	330	8.4	10
SHA-470-2000	330	6.6	10
SHA-470-2400	330	5.5	10



Changing shafts and rollers

Always change the shafts (10/20, Fig. 7) together with the associated rollers (20/100, Fig. 8).

Disassembling the slide



- The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.
- Ensure that no unauthorized switching-on of the supply voltage can occur.
- During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).
- Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

- Mark the position of the slide.
- Remove the covers (70, Fig. 6).
- Mark the position of the clamps (190 and 200, Fig. 6) in relation to the adapter plate (20/40, Fig. 8).
- Undo the setscrew (460, Fig. 6) (do not remove).
- Undo screws (340, Fig. 6) and remove the clamps (190, 200) from the slide.
- Remove the accessories from the adapter plate (20/40, Fig. 8). If the fastening screws (20/150, Fig. 8) of the adapter plate (20/40, Fig. 8) are easily accessible, you can remove the adapter plate together with the attached accessories. Be sure not to damage the pinholes of the adapter plate.
- Undo the nut (20/70, Fig. 8).
- Using a Allen key, turn the eccentric bolt (20/50, Fig. 8) to the bottom position.
- Hinge out the lower part of the slide (20, Fig. 6). Because of the activation plate (20/80, Fig. 8), the upper part of the slide cannot be hinged out.
- Remove the slide (20, Fig. 6).

Changing the rollers

- Unscrew the eccentric shaft (20/50, Fig. 8) and the concentric shaft (20/60, Fig. 8) from the nut (20/70, Fig. 8). To do so, hold the hexagon socket head of the eccentric or concentric shaft with a 3 mm Allen key.
- Change the rollers (20/100, Fig. 8) (always change all rollers).
- Install the concentric shaft (20/60, Fig. 8), shim (20/110, Fig. 8), roller (20/100, Fig. 8) and nut (20/70, Fig. 8) and tighten. Hold with Allen key.
- Install the eccentric shaft (20/50, Fig. 8), shim (20/110, Fig. 8), roller (20/100, Fig. 8) and nut (20/70, Fig. 8). Eccentric in lower position. Tighten the nut only slightly; it will only be tightened properly when the slide play is being set.

Changing the shafts

The shafts (10/20, Fig. 7) can be removed laterally on the side of the deflection roller or on the side of the drive. If the available space makes it possible to change the shafts on the side of the deflection roller, this option is preferable to that on the drive side because the latter requires additional work.

If the shaft cannot be de-installed with the servo horizontal axis removed, de-install the latter by undoing the tension elements SLL-55 (Fig. 4). After this you can remove the shafts on the side of the deflection roller.

Side of the deflection roller

- Remove the cover of the deflection roller (110, Fig. 6) by undoing the machine screws (370, Fig. 6).
- Remove both cap screws (50/70, Fig. 10).
- Pull out the shafts (10/20, Fig. 7).
- Insert new shafts to the stop.
- Install in reverse order.

Drive side

- Remove the toothed belt according to "Changing the toothed belt (270, Fig. 6)".
- Undo the nut (50/200, Fig. 9); remove the washer (50/190, Fig. 9).
- Using a special tool, undo the crown gear (50/60, Fig. 9) from the cone of the gear shaft.
- Remove the crown gear.
- Remove both cap screws (50/110, Fig. 9).
- Pull out the shafts (10/20, Fig. 7).
- Insert the new shaft to the stop.
- Install both cap screws (50/110, Fig. 9).
- Install crown gear (50/60, Fig. 9), washer (50/190, Fig. 9) and nut (50/200, Fig. 9).
- Carry out final assembly according to the following chapter.
- After completion of final assembly, install the toothed belt according to "Changing the toothed belt" (270, Fig. 6).

Final assembly

- Slide in the upper part of the slide. Hinge-in the lower part.
- Eliminate slide play according to "Setting the slide play".
- Reattach to the adapter plate (20/40, Fig. 8) any accessories that may have been removed. If the accessories were removed complete with the adapter plate (20/40, Fig. 8), take particular care when installing the adapter plate to avoid damage to the pin holes.
- Install the covers (70, Fig. 6).
- Attach the clamps (190, 200, Fig. 6), screws (340, Fig. 6) and washers (350, Fig. 6) in the marked positions to the adapter plate.
- Set the toothed belt pretension according to "Setting the toothed belt pretension".
- Check the work carried out.
- Carry out offset correction according to the operator software manual "Commissioning after mechanical maintenance work".

Setting the slide play



- The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.
- Ensure that no unauthorized switching-on of the supply voltage can occur.
- During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).
- Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

- Slightly undo the top nuts (20/70, Fig. 8).
- Set the rollers (20/100, Fig. 8) so that there is no play, by turning the eccentric bolts (20/50, Fig. 8) clockwise (without any initial tension).
- Tighten the upper nuts (20/70, Fig. 8) while holding the eccentric bolts (20/50, Fig. 8) with a hexagon socket head wrench to prevent the position of the tension nut from changing.

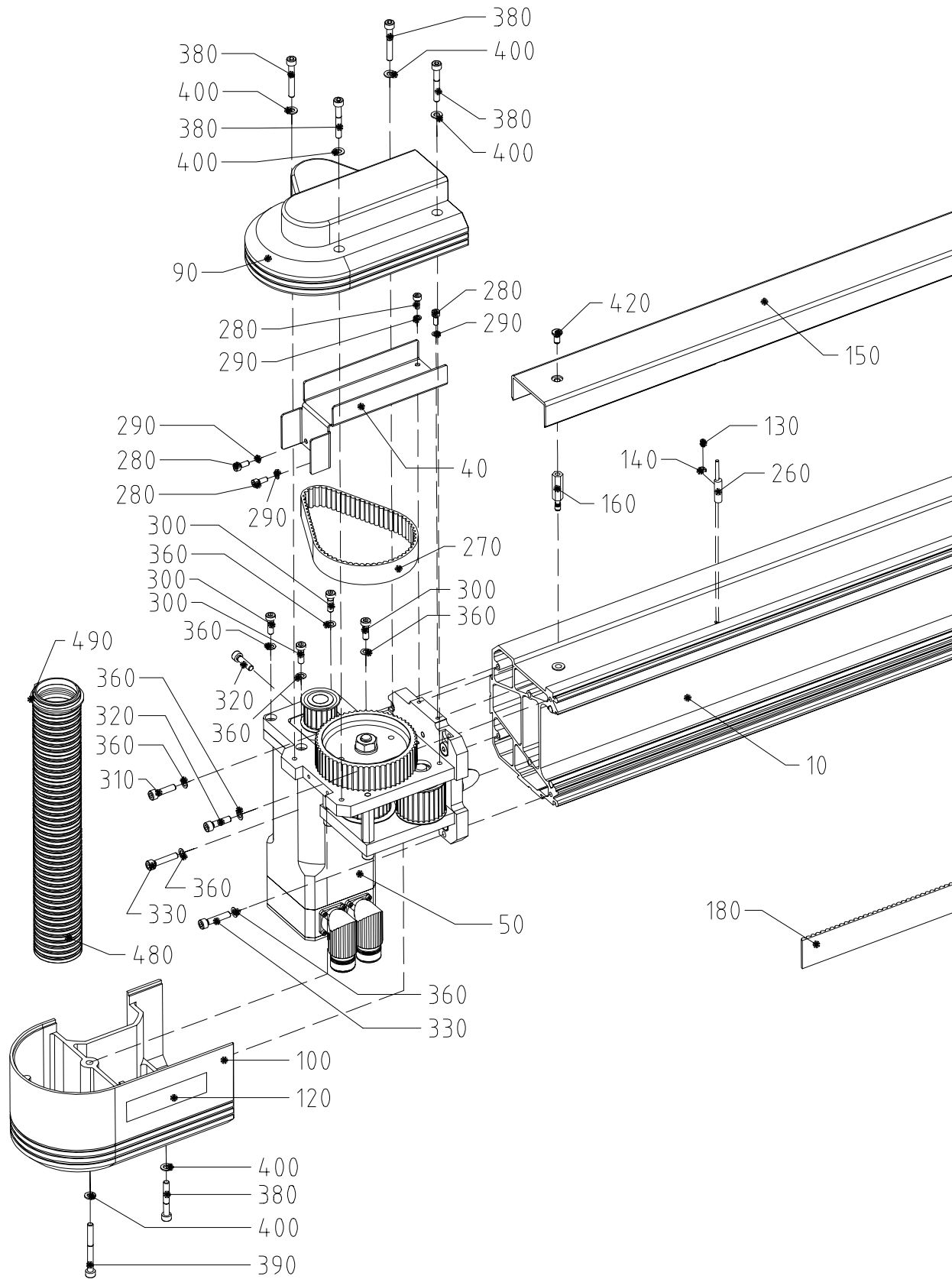
Changing the inductive proximity switch

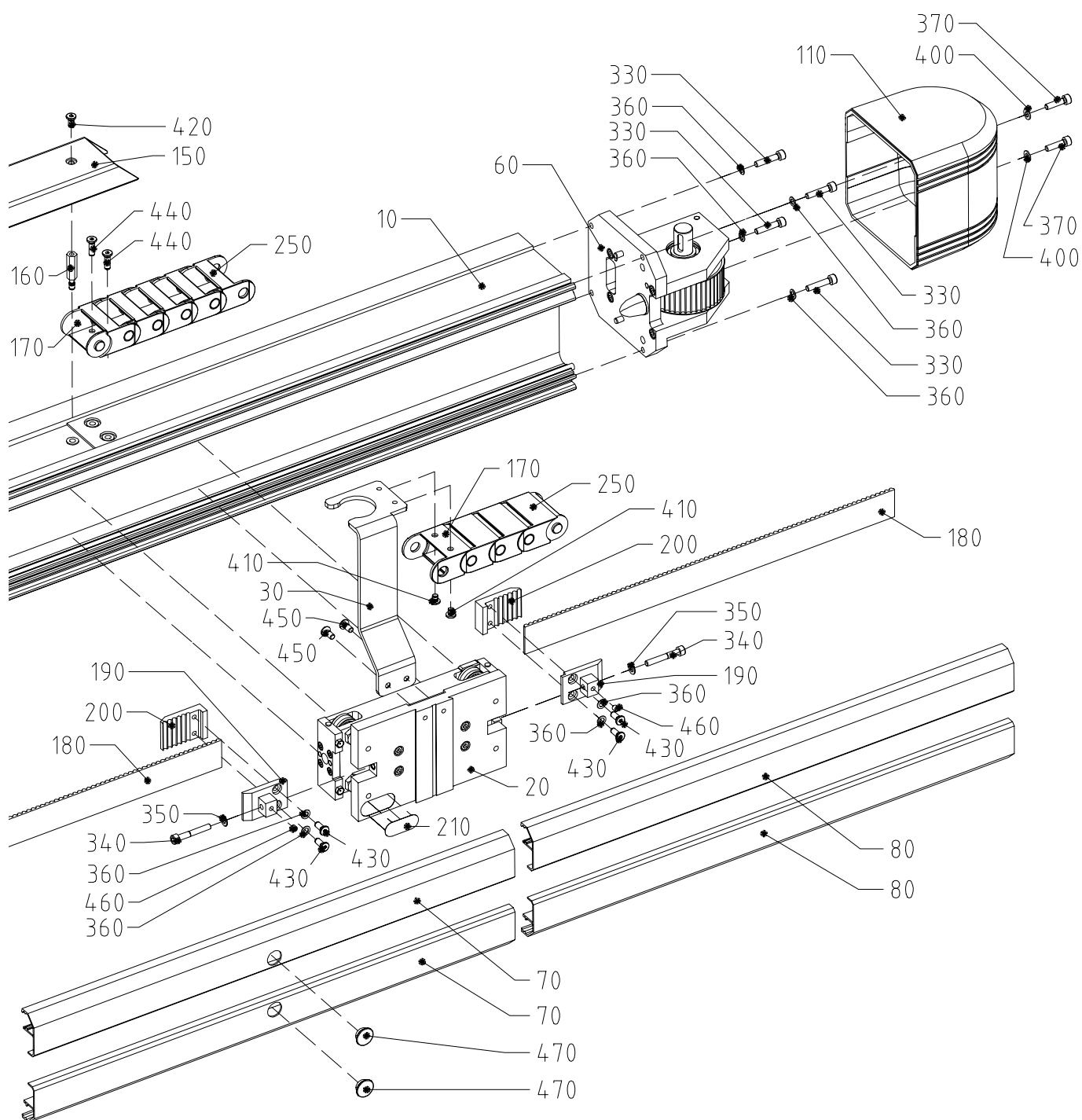


- The servo amplifier must be disconnected from the supply voltage. Switch off the mains switch or mains contactor.
- Ensure that no unauthorized switching-on of the supply voltage can occur.
- During operation the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).
- Failure to observe these protective measures may result in life-threatening or severe personal injuries or material damage.

- Undo the machine screws (420, Fig. 6) and remove the cable duct (150, Fig. 6).
- Undo the clamping screw (140, Fig. 6) and remove the proximity switch (260, Fig. 6).
- Insert the new proximity switch (260, Fig. 6) through the protective hose (540, Fig. 6) into the carrier profile (10, Fig. 6) and push it to the stop.
- Attach the proximity switch (260, Fig. 6) by slightly tightening the clamping screw (140, Fig. 6).
- Carry out a collision check by moving the body of the slide.
- Install the cable duct (150, Fig. 6) and the screws (420, Fig. 6).
- Connect the inductive proximity switch (260, Fig. 6) according to "Connecting the inductive proximity switch".

Fig. 6





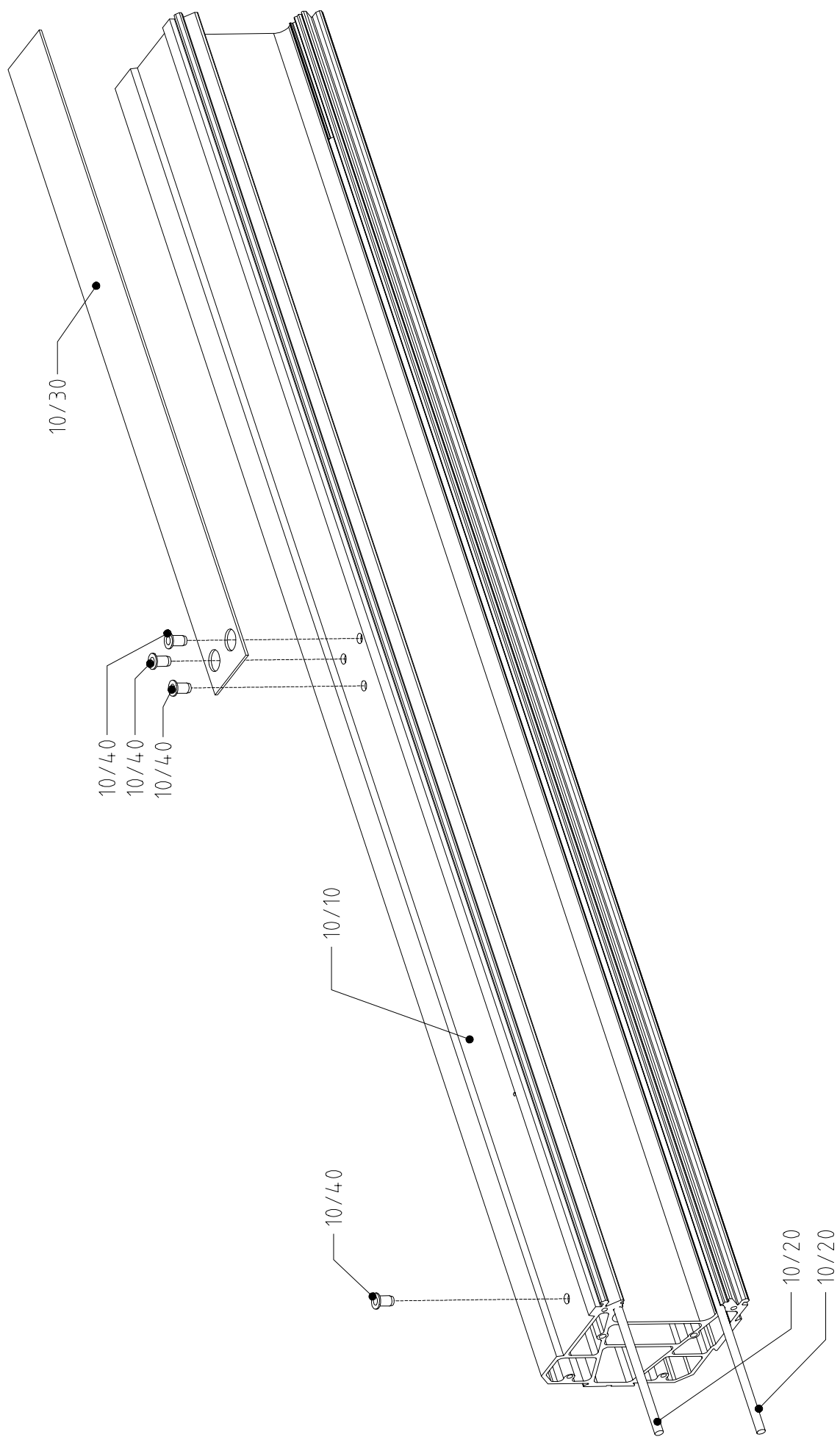
Spare parts list

Servo horizontal axis SHA-470

Pos	Designation	Item no.					Supplier	Material
		SHA-470-	-800	-1200	-1600	-2000	-2400	
10	Carrier assembly	48311	48312	48313	48314	48315	Montech AG	Various
20	Slide assembly	48282	48282	48282	48282	48282	Montech AG	Various
30	Hose retainer	48285	48285	48285	48285	48285	Montech AG	Aluminum
40	Guard plate	48281	48281	48281	48281	48281	Montech AG	Stainless steel
50	Gear assembly	48276	48276	48276	48276	48276	Montech AG	Various
60	Deflection assembly	48284	48284	48284	48284	48284	Montech AG	Various
70	Cover with lubrication aperture	46798	46798	46798	46798	46798	Montech AG	Aluminum
80	Cover	46799	46800	46801	46802	46803	Montech AG	Aluminum
90	Hood, top	48160	48160	48160	48160	48160	Montech AG	PUR
100	Hood, bottom	48152	48152	48152	48152	48152	Montech AG	PUR
110	Hood, deflection	48151	48151	48151	48151	48151	Montech AG	PUR
120	Montech Logo	41176	41176	41176	41176	41176	Montech AG	PVC cadmium-free
130	Clamping piece	47906	47906	47906	47906	47906	Montech AG	Steel
140	Clamping screw	47904	47904	47904	47904	47904	Montech AG	Steel
150	Cable duct	48287	48288	48289	48290	48291	Montech AG	Aluminum
160	Spacer	48317	48317	48317	48317	48317	Montech AG	Steel
170	Connecting chain link	46732	46732	46732	46732	46732	Montech AG	
180	Toothed belt	46808	46809	46810	46811	46812	Rud. Uiker AG	Steel / PUR
190	Clamp, top	46759	46759	46759	46759	46759	Montech AG	Aluminum
200	Clamp, bottom	46760	46760	46760	46760	46760	Montech AG	Aluminum
210	Type plate CE	41620	41620	41620	41620	41620	Montech AG	Polyester metal.
250	Chain link	505909	505909	505909	505909	505909	FMO SA	
260	Proximity switch	506321	506321	506321	506321	506321	Baumer	Various
270	Toothed belt	506190	506190	506190	506190	506190	Rud. Uiker AG	Fiberglass / PUR
280	Machine screw M4x10	501619	501619	501619	501619	501619	Bossard AG	Steel
290	Ribbed washer M4	502364	502364	502364	502364	502364	Bossard AG	Steel
300	Machine screw M5x16	506191	506191	506191	506191	506191	Bossard AG	Steel
310	Machine screw M5x25	501767	501767	501767	501767	501767	Bossard AG	Steel

Pos	Designation	Item no.					Supplier	Material
		SHA-470-	-800	-1200	-1600	-2000		
320	Machine screw M5x20	501642	501642	501642	501642	501642	Bossard AG	Steel
330	Machine screw M5x25	501643	501643	501643	501643	501643	Bossard AG	Steel
340	Machine screw M5x35	501645	501645	501645	501645	501645	Bossard AG	Steel
350	Washer M5	506304	506304	506304	506304	506304	Bossard AG	Steel
360	Ribbed washer M5	502365	502365	502365	502365	502365	Bossard AG	Steel
370	Machine screw M5x20	504799	504799	504799	504799	504799	Bossard AG	Stainless steel
380	Machine screw M5x35	506193	506193	506193	506193	506193	Bossard AG	Stainless steel
390	Machine screw M5x80	506194	506194	506194	506194	506194	Bossard AG	Stainless steel
400	Washer M5	506305	506305	506305	506305	506305	Bossard AG	Stainless steel
410	Machine screw M5x6	506195	506195	506195	506195	506195	Bossard AG	Steel
420	Machine screw M5x10	506320	506320	506320	506320	506320	Bossard AG	Steel
430	Machine screw M5x12	506317	506317	506317	506317	506317	Bossard AG	Steel
440	Machine screw M5x16	506196	506196	506196	506196	506196	Bossard AG	Steel
450	Countersunk screw M5x12	501810	501810	501810	501810	501810	Bossard AG	Steel
460	Setscrew M5x4	501909	501909	501909	501909	501909	Bossard AG	Steel
470	Protective plug	506199	506199	506199	506199	506199	Angst + Pfister AG	PE
480	Protective hose PG36	504645	504645	504645	504645	504645	PMA Elektro AG	PA
490	Circlip ø42	504779	504779	504779	504779	504779	Bossard AG	Steel
500	Circlip ø35	502461	502461	502461	502461	502461	Bossard AG	Steel
390	User manual germ.	506187	506187	506187	506187	506187	Montech AG	Paper
391	User manual engl.	506498	506498	506498	506498	506498	Montech AG	Paper
392	User manual french	506499	506499	506499	506499	506499	Montech AG	Paper
393	User manual ita.	506600	506600	506600	506600	506600	Montech AG	Paper
394	User manual span.	506601	506601	506601	506601	506601	Montech AG	Paper
395	User manual swed.	506602	506602	506602	506602	506602	Montech AG	Paper

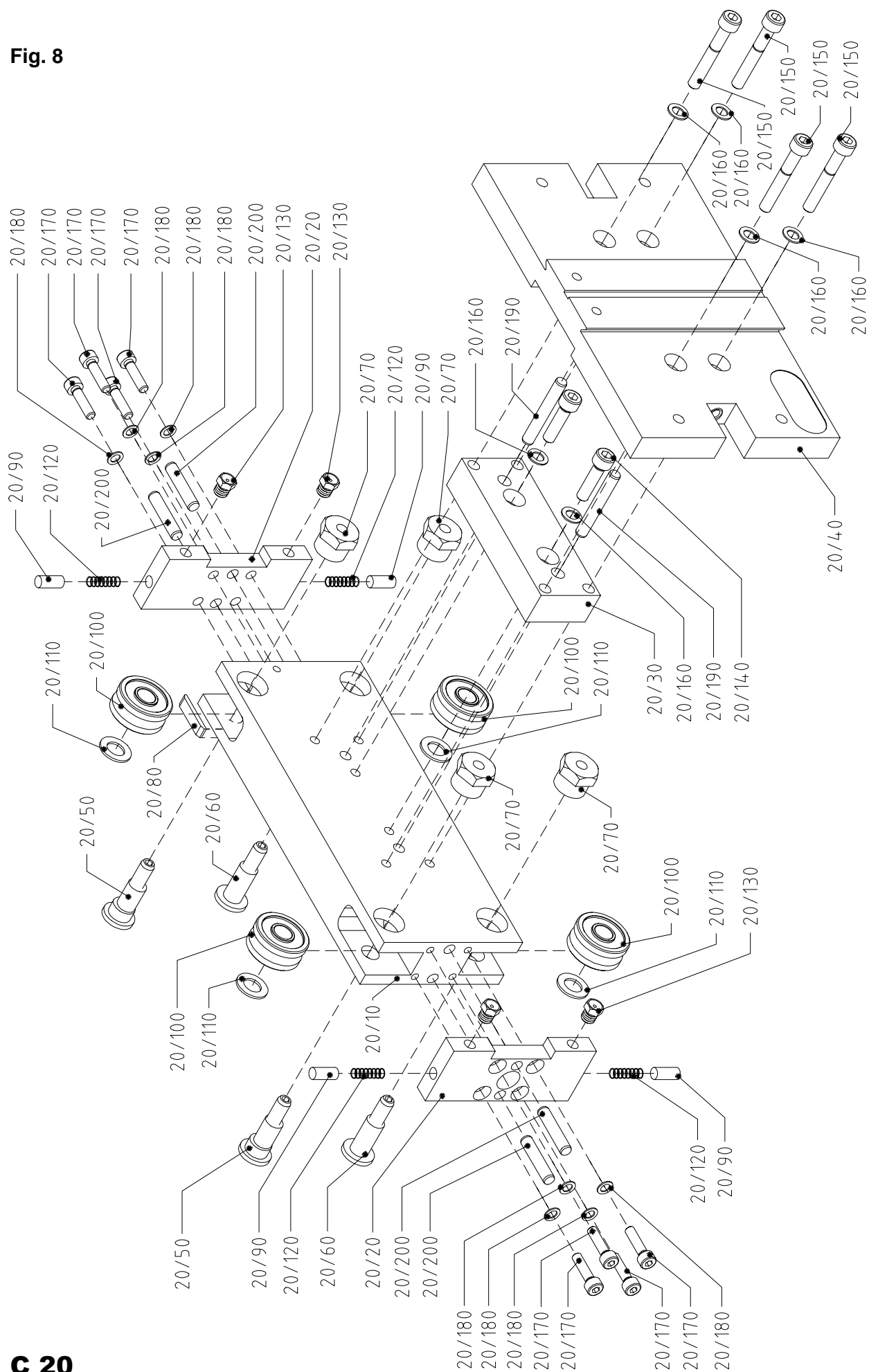
Fig. 7



Carrier assembly

Pos.	Designation	Item no.					Supplier	Material
	SHA-470-	-800	-1200	-1600	-2000	-2400		
10	Carrier assembly	48311	48312	48313	48314	48315		
10/10	Carrier	46783	46784	46785	46786	46787	Montech AG	Aluminum
10/20	Shaft	46793	46794	46795	46796	46797	Hydrel AG	Steel
10/30	Foam tape	48302	48303	48304	48305	48306	Montech AG	PUR
10/40	Blind rivet nut M5	48276	48276	48276	48276	48276	Bossard AG	Aluminum

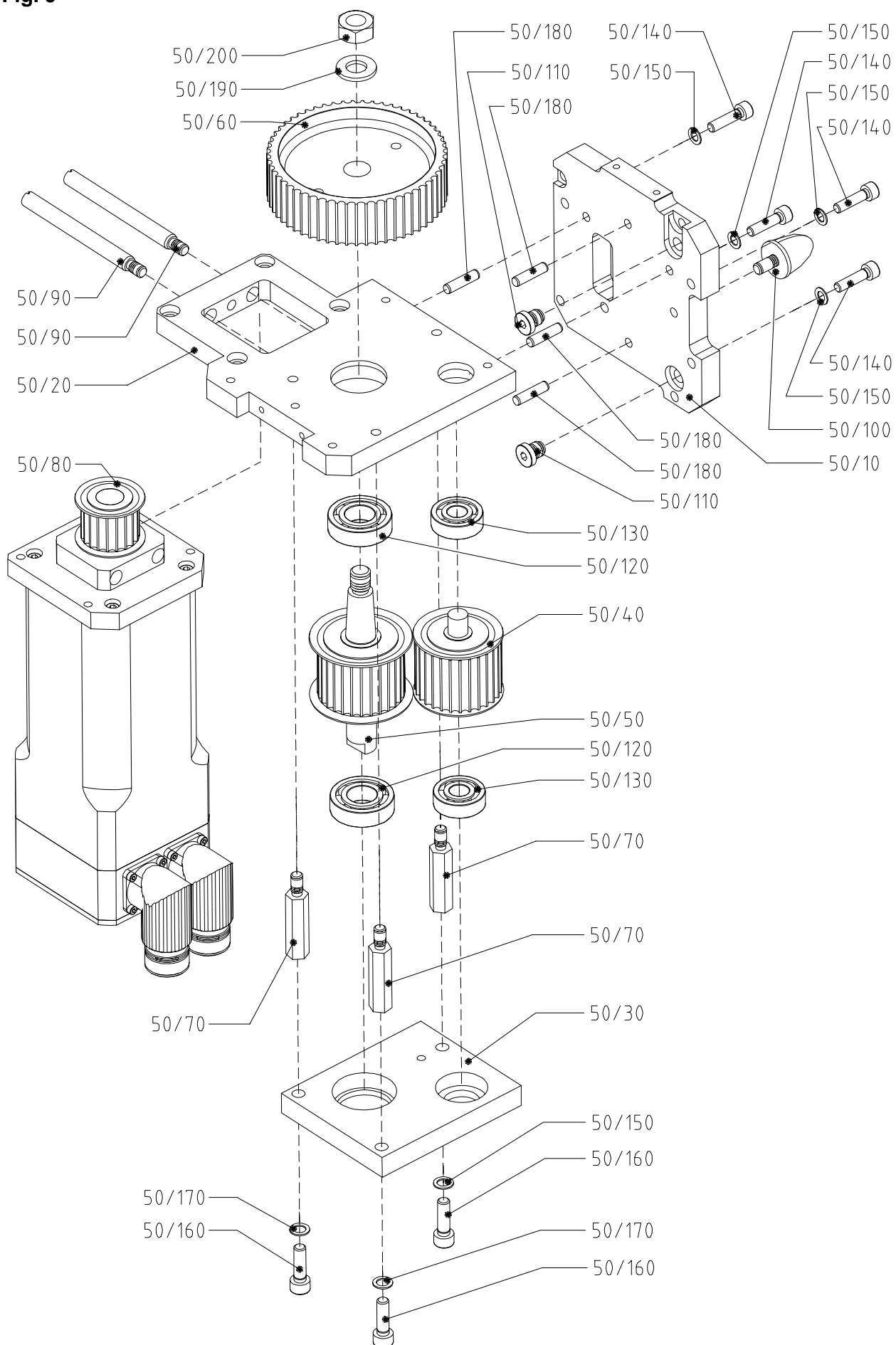
Fig. 8



Slide assembly

Pos.	Designation	Item no.	Supplier	Material
20	Slide assembly	48282		
20/10	Slide body	48270	Montech AG	Aluminum
20/20	End plate	48271	Montech AG	Aluminum
20/30	Spacer plate	48273	Montech AG	Aluminum
20/40	Adapter plate	48281	Montech AG	Aluminum / steel
20/50	Eccentric bolt	48267	Montech AG	Steel
20/60	Concentric bolt	48274	Montech AG	Steel
20/70	Nut	48275	Montech AG	Steel
20/80	Activation plate	46804	Montech AG	Steel
20/90	Felt wick	40921	Montech AG	Wool felt
20/100	Roller	503663	Hydrel AG	Steel
20/110	Shim	505919	Bossard AG	Steel
20/120	Pressure spring	504119	Kubo Tech AG	Steel
20/130	Lubricating nipple	504554	Hausammann AG	Brass
20/140	Machine screw M5x20	501642	Bossard AG	Steel
20/150	Machine screw M5x35	501645	Bossard AG	Steel
20/160	Ribbed washer M5	502365	Bossard AG	Steel
20/170	Machine screw M4x16	501622	Bossard AG	Steel
20/180	Ribbed washer M4	502364	Bossard AG	Steel
20/190	Straight pin ø6x36	502066	Bossard AG	Steel
20/200	Straight pin ø5x24	506164	Bossard AG	Steel

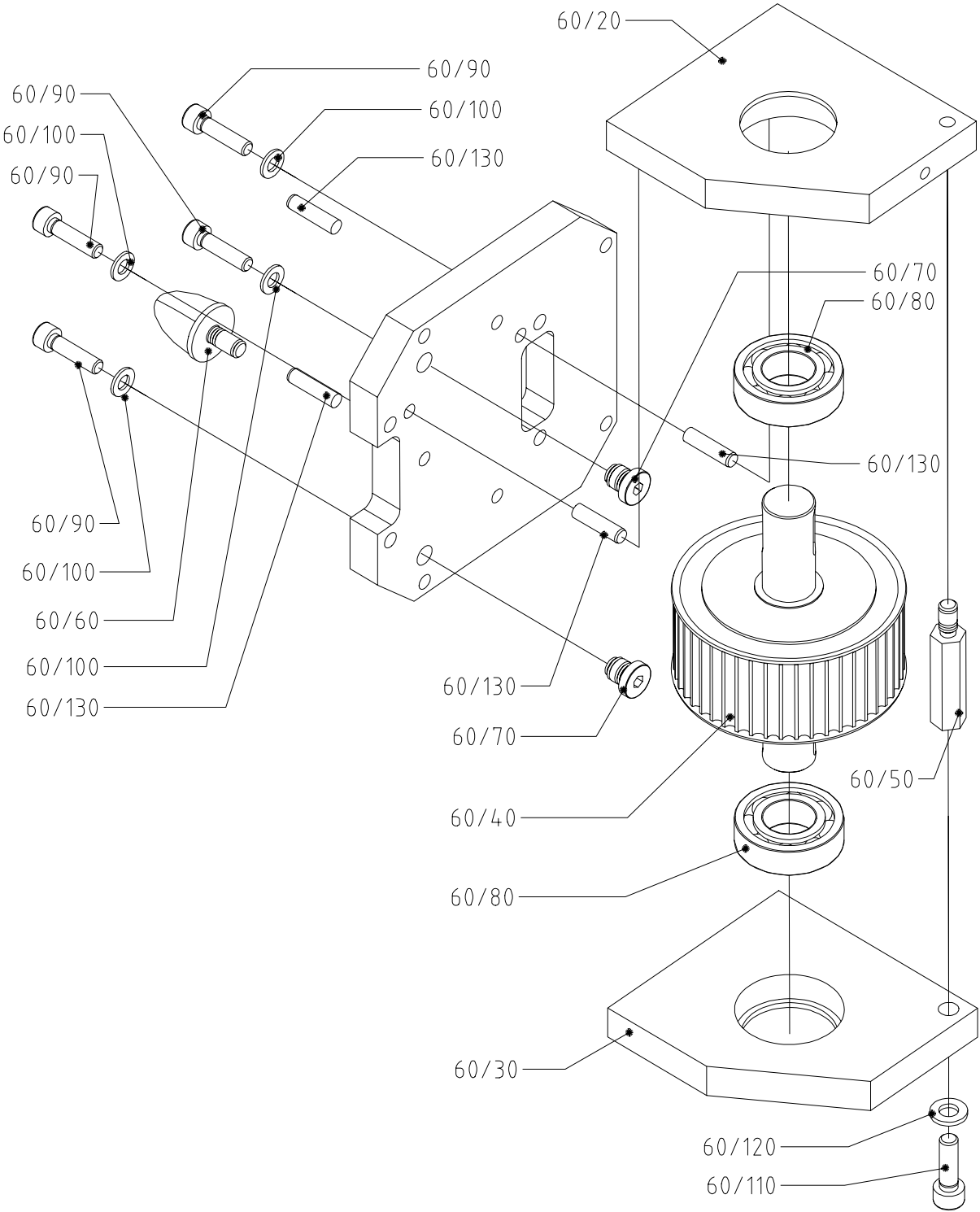
Fig. 9



Gear assembly

Pos.	Designation	Item no.	Supplier	Material
50	Gear assembly	48276		
50/10	Connection plate	48175	Montech AG	Aluminum
50/20	Bearing plate, top	48141	Montech AG	Aluminum
50/30	Bearing plate, bottom	48173	Montech AG	Aluminum
50/40	Deflection shaft	48278	Montech AG	Aluminum / steel
50/50	Gear shaft	48277	Montech AG	Steel
50/60	Crown gear	47932	Montech AG	Steel
50/70	Spacer bolt	47970	Montech AG	Steel
50/80	Servomotor	48269	Montech AG	Various
50/90	Guide rod	48176	Montech AG	Steel
50/100	Elastomer stops	48279	Montech AG	NR / steel
50/110	Cap screws	48263	Montech AG	PUR / steel
50/120	Deep groove ball bearing	504760	Kellenberg + Co. AG	Steel
50/130	Deep groove ball bearing	501378	Kellenberg + Co. AG	Steel
50/140	Machine screw M5x20	501642	Bossard AG	Steel
50/150	Ribbed washer	502365	Bossard AG	Steel
50/160	Machine screw M6x20	501660	Bossard AG	Steel
50/170	Ribbed washer	502366	Bossard AG	Steel
50/180	Straight pin ø5x20	502050	Bossard AG	Steel
50/190	Washer	502419	Bossard AG	Steel
50/200	Hex nut	501998	Bossard AG	Steel

Fig. 10



Deflection assembly

Pos.	Designation	Item no.	Supplier	Material
60	Deflection assembly	48284		
60/10	Connection plate	48177	Montech AG	Aluminum
60/20	Bearing plate, top	47974	Montech AG	Aluminum
60/30	Bearing plate, bottom	47975	Montech AG	Aluminum
60/40	Deflection shaft	48266	Montech AG	Aluminum / steel
60/50	Spacer bolt	47970	Montech AG	Steel
60/60	Elastomer stops	48279	Montech AG	Natural rubber / steel
60/70	Cap screw	48263	Montech AG	PUR / steel
60/80	Deep groove ball bearing	501379	Kellenberg + Co. AG	Steel
60/90	Machine screw M5x20	501642	Bossard AG	Steel
60/100	Ribbed washer	502365	Bossard AG	Steel
60/110	Machine screw M6x20	501660	Bossard AG	Steel
60/120	Ribbed washer	502366	Bossard AG	Steel
60/130	Straight pin ø5x20	502050	Bossard AG	Steel

Environmental compatibility and disposal

Materials used

- Aluminum
- Steel
- Brass
- Wool fiber
- PUR Polyurethane
- PS Polystyrene
- PA Polyamide
- PE Polyethylene
- NR Natural rubber

Surface refinement

- Anodic oxidation of aluminum
- Blackening of steel

Forming processes

- Profile extruding of aluminum
- Material-removing processes (metals and plastics)
- Vacuum-casting of plastics

Emissions during operation

- None

Disposal

Servo horizontal axes (SHA-470) or handling units retrofitted to portal loaders that are no longer in use, are to be dismantled and recycled according to the type of material. The type of material for each part is stated in the spare parts list. Any non-recyclable material is to be disposed of properly according to materials, taking into account the regulations which apply in your location.